Remarks

Claims 1 and 3 to 20 inclusive are being prosecuted.

By this amendment the limitations of claim 2 have been incorporated into claim 1 and claim 2 has bee deleted tp accommodate the addition to claim 1.

Reconsideration of the rejections of the claims of this application is respectfully requested in the light of the following remarks

Claim 1 has now been restricted to define a process where all of the mixing adding etc is carried out in a single stage rather than in a plurality of different stages as set forth and is essential to the teachings of the Messier patent. Furthermore the a process of the present invention where all of the mixing adding etc is carried out in a single stage rather than in a plurality of different stages provides a very robust process of hydrophobic extraction wherein the simplicity of using a single stage operation provides flexibility and easy process-control. The single stage process of the present invention also reduces both the capital and operational costs as well as maintenance problems.

It is submitted that the objection to claims 1, 5, and 7 under 35 U.S.C. 102(b) set forth in the 3rd paragraph of page 2 of the Action has become moot as claim 1 is now equivalent in scope to claim 2 which was not subject to this rejection

As it is believed has been recognized by the Examiner in Messer's patent, separations of carbonaceous material, non-carbonaceous particles and solids-free water from aqueous slurry are accomplished in an order based on the step-by-step procedure. Namely, in the first step (see Messer's patent col. 3 line 47 through col. 5 line 29), carbonaceous particles are agglomerated discretely and then, in the second step (see Messer's patent col. 5 line 30 through col. 6 line 41), the agglomerated first mixture is separated from the slurry. In the third step (see Messer's patent col. 6 line 42 through col. 9 line 29), non-carbonaceous particles remained in the slurry are flocculated. In the last step (see Messer's patent col. 9 line 30 through col. 11 line 59), finally, the flocculated second mixture is separated to produce solids-free water.

It is also believed the Examiner is aware that in the present invention as current defined in amended claim 1 these separations take place simultaneously, as schematically presented in

Figure 10, by integrating three distinct mechanisms, i.e. hydrophobic extraction of fine coals and a combination of coagulation and flocculation to clarify process water, in a single stage process, which highlights the novelty of our invention.

In addition, the hydrophobic extraction featured in the instant invention is conceptually different from the oil agglomeration process shown in Messer's patent. For example, in Messer's patent, a lyophobic liquid is used as a bridge to link carbonaceous particles to form discrete agglomerates. In the present invention, oil is used to produce a liquid fuel in the form of coal-in-oil mixture. As a result, the moisture content of the products of the present invention is minimal compared to the moisture in the agglomerates of Messer which may be as high as 12 percent (see Messer's patent col. 5 line 61).

Reconsideration of the objection to claims 1 and 4-7 under 35 U.S.C. 103(a) set forth in the last paragraph of page 2 of the Action is also respectfully requested. The method described in the Messer's patent 4,477,353 provides a system for the formation of discrete agglomerates of coal to separate the carbonaceous materials from slurry (see Messer's patent col. 4 line 40, col. 4 line 62, col. 4 line 67, col. 5 line 8, col. 12 line 14 and col. 13 line 47). It requires adding the lyophobic liquid less than 20 % by weight of the total solids in slurry (see Messer's patent col. 4 line 60 through col. 4 line 65, col. 12 line 5 and col. 13 line 38). However, in the present invention, a liquid fuel in the form of coal-in-oil mixture is produced by the addition of oil in the amount of between 100 and 250 % based on the dry weight of the coal fines in the suspension.

The maximum amount of oil allowed in Messer's patent is significantly smaller than the amount utilized in the present invention. This is not merely a matter of choice, rather the amounts used in the present invention result in the generation of a final product having features completely different from those of the product produce by Messer.

It is submitted that it is clear that the present invention is conceptually different from Messer's method. The present invention is based on hydrophobic extraction of hydrophobic coal fines into the added oil phase while in Messer's approach, the oil is used to bridge the particles. Moreover, the addition of the oil in the present invention is simultaneously conducted with the addition of either a flocculating agent, a coagulating agent or a combination of flocculating agent and coagulating agent to achieve a simultaneous hydrophobic extraction of

coal and aggregation of fine refuse solids in a single stage, which is as recognized above another distinct novelty of this invention.

To accomplish the objectives of the present invention Applicant has taught the importance of a careful selection of flocculant or coagulant types and their dosages including the mixing ratios of these agents becomes extremely important in the present invention as unfavorable selection of reagent scheme may interfere with the hydrophobic extraction, depending on the type of agents added and their amounts and addition schemes (see our description page 9 line 15 through page 11 line 14).

Reconsideration of the objection to claims 2 (current claim 1), 3, and 8-20 under 35 U.S.C. 103(a) set forth in the 1st paragraph of page 3 of the Action and based on combining the Messer patent with the Yoon patent is respectfully requested

First it is important to understand the role of coagulant in method of Yoon verses that of the present invention . For example, in example 17 of Yoon, it is clearly stated that aluminum ions (a typical coagulating agent) are added as an aid to facilitate the adsorption of hydrophobic lipid molecules on the moderately hydrophobic surface. In order to facilitate the adsorption, the coal slurry was conditioned in the presence of aluminum chloride before adding a desired amount of oil (see Yoon's patent col. 20 line 32 through line 34). In the present invention, however, the use of inorganic coagulants such as positively charged calcium ions is to aid the clarification of effluent, which has nothing to do with facilitating the adsorption of hydrophobic lipid molecules on the moderately hydrophobic surface as in Yoon's invention. In the present invention, hydrophobic fine coals are extracted into a continuous oil phase without need of adding hydrophobic lipids as involved in Yoon's technology. In fact, coagulant in the present invention functions oppositely on fine waste particles to enhance aggregation by anionic flocculant.

Since the operation of the Yoon invention is no analogous with the present invention and for that matter with the Messer invention the manner in which Yoon make his additions does not make the use of a single stage as defined in claim 1 obvious based on a combination of Yoon and Messer in fact such a combination of references it is submitted cannot be logically made.

The other reference made of record but not applied have been considered and are believed not to be particularly relevant to the present invention. For example, the process invented by Keller et. al. provides an agglomeration method similar to Messer's patent, but using different

types of lyophobic liquids, having particular specifications on the interfacial tension with water, molecular oxygen content, solubility in water, etc., to reduce the agglomeration time between carbonaceous particles and facilitate the selective agglomeration.

Both patents by Wang et. al. and Yoon disclose methods of dewatering fine particulate materials. The similarity from both methods is in the surface modification of carbonaceous particle using surface-active agents, in order to enhance the adsorption of hydrophobic lipid molecules on the hydrophobic surface followed by the destabilization of water molecules adhering to the surface. As a result, the moisture content of filter cake can be reduced. These are totally different from the present invention.

It is important to understand that the invention as defined and claimed provides a single step process capable of recovering clean coals (in the form of coal-in-oil mixture fuel) without using any surface active agent such as lipids, from coal tailings and at the same time clarifying the process water for recycle or safe disposal. The single step process is integrated with three distinct mechanisms, i.e., hydrophobic extraction, electrolyte coagulation and macromolecular flocculation with the key feature of hydrophobic extraction of fine coals into oil phase.

It is believed this application in now in condition for Allowance and such action is respectfully requested.

Respectfully submitted,

OFFICIAL

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